

# **REAL TIME TRAFFIC CONDITION REPORTING SYSTEM**

## **BACKGROUND OF THE INVENTION**

### **1. Field of the Invention**

The present invention relates to a real time traffic condition reporting system and, more particularly, to such a real time traffic condition reporting system that can be carried on a mobile object movable on the road to dynamically provide the information of traffic conditions subject to the geometric location of the mobile object to fit individual needs. The real time traffic condition reporting system can be used in a motor vehicle, PDA (Personal Digital Assistant), cellular telephone, or any of a variety of portable electronic apparatus.

### **2. Description of Related Art**

When driving a car or walking on the road, we may encounter different traffic conditions, for example, road under-construction, landslide, traffic control, traffic jam, bridge closed, etc. In this case, people may have to make a detour.

In order to avoid passing to the locations where particular traffic conditions occurred, people may receive traffic condition broadcasting of radio stations or dial a service telephone number to receive a voice traffic condition report. However, in order to meet public requirements, regular radio station traffic condition broadcasting or telephone voice traffic condition report provides traffic condition information of a broad geometric zone. This traffic condition broadcasting or telephone voice traffic condition report service cannot provide the traffic condition information of the geometric location of every individual to meet

individual's needs. Further, because telephone voice traffic condition report service updates the content after every predetermined length of time, the user cannot obtain real time traffic condition information.

Therefore, it is desirable to provide a real time traffic condition

5 reporting system that eliminates the aforesaid drawbacks.

### SUMMARY OF THE INVENTION

The main object of the present invention is to provide a real time traffic condition reporting system, which dynamically provides real time traffic condition information subject to the current geometric location of

10 the user, so as to meet the needs of the user individually.

To achieve these and other objects of the present invention, the

real time traffic condition reporting system comprises a global positioning unit, a radio transmitting receiving unit, an output unit, and a microprocessor. The global positioning unit computes the information of

15 the current geometric location of the real time traffic condition reporting

system. The radio transmitting receiving unit receives the information of multiple geometric locations where the traffic conditions occurred and the information of the corresponding traffic conditions. The microprocessor compares the information of the current geometric

20 location provided by the global positioning unit with the information of

the geometric locations of the traffic conditions occurred, so as to select the information of the geometric locations of the traffic conditions occurred and the corresponding information of traffic conditions subject to a predetermined condition for output through the output unit.

25 The predetermined condition can be a particular geometric zone,

for example, the area within a particular radius, a particular country, a particular town, a particular mail address zone, or a particular road. The invention can further include a memory device adapted to store the information of geometric locations of traffic conditions occurred and the 5 information of the corresponding traffic conditions. The invention can also further include an electronic map database adapted to store electronic maps for fetching by the microprocessor for further output through the output unit with the selected information of the geometric locations of the traffic conditions occurred and the corresponding 10 information of traffic conditions.

Other objects, advantages, and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

#### BRIEF DESCRIPTION OF THE DRAWINGS

15 FIG. 1 is a system block diagram of the preferred embodiment of the present invention.

FIG. 2 is a traffic condition information table showing the information of traffic conditions gathered by a remote traffic condition control center according to the present invention.

20 FIG. 3 is a traffic condition information table showing the information of all traffic conditions received by the radio transmitting receiving unit according to the present invention.

FIG. 4 is a traffic condition information table showing the information of traffic conditions selected subject to a predetermined 25 condition according to the present invention.

3  
4  
5  
6  
7  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60  
61  
62  
63  
64  
65  
66  
67  
68  
69  
70  
71  
72  
73  
74  
75  
76  
77  
78  
79  
80  
81  
82  
83  
84  
85  
86  
87  
88  
89  
90  
91  
92  
93  
94  
95  
96  
97  
98  
99  
100  
101  
102  
103  
104  
105  
106  
107  
108  
109  
110  
111  
112  
113  
114  
115  
116  
117  
118  
119  
120  
121  
122  
123  
124  
125  
126  
127  
128  
129  
130  
131  
132  
133  
134  
135  
136  
137  
138  
139  
140  
141  
142  
143  
144  
145  
146  
147  
148  
149  
150  
151  
152  
153  
154  
155  
156  
157  
158  
159  
160  
161  
162  
163  
164  
165  
166  
167  
168  
169  
170  
171  
172  
173  
174  
175  
176  
177  
178  
179  
180  
181  
182  
183  
184  
185  
186  
187  
188  
189  
190  
191  
192  
193  
194  
195  
196  
197  
198  
199  
200  
201  
202  
203  
204  
205  
206  
207  
208  
209  
210  
211  
212  
213  
214  
215  
216  
217  
218  
219  
220  
221  
222  
223  
224  
225  
226  
227  
228  
229  
230  
231  
232  
233  
234  
235  
236  
237  
238  
239  
240  
241  
242  
243  
244  
245  
246  
247  
248  
249  
250  
251  
252  
253  
254  
255  
256  
257  
258  
259  
259  
260  
261  
262  
263  
264  
265  
266  
267  
268  
269  
270  
271  
272  
273  
274  
275  
276  
277  
278  
279  
280  
281  
282  
283  
284  
285  
286  
287  
288  
289  
289  
290  
291  
292  
293  
294  
295  
296  
297  
298  
299  
300  
301  
302  
303  
304  
305  
306  
307  
308  
309  
310  
311  
312  
313  
314  
315  
316  
317  
318  
319  
320  
321  
322  
323  
324  
325  
326  
327  
328  
329  
330  
331  
332  
333  
334  
335  
336  
337  
338  
339  
339  
340  
341  
342  
343  
344  
345  
346  
347  
348  
349  
349  
350  
351  
352  
353  
354  
355  
356  
357  
358  
359  
359  
360  
361  
362  
363  
364  
365  
366  
367  
368  
369  
369  
370  
371  
372  
373  
374  
375  
376  
377  
378  
379  
379  
380  
381  
382  
383  
384  
385  
386  
387  
388  
389  
389  
390  
391  
392  
393  
394  
395  
396  
397  
398  
399  
399  
400  
401  
402  
403  
404  
405  
406  
407  
408  
409  
409  
410  
411  
412  
413  
414  
415  
416  
417  
418  
419  
419  
420  
421  
422  
423  
424  
425  
426  
427  
428  
429  
429  
430  
431  
432  
433  
434  
435  
436  
437  
438  
439  
439  
440  
441  
442  
443  
444  
445  
446  
447  
448  
449  
449  
450  
451  
452  
453  
454  
455  
456  
457  
458  
459  
459  
460  
461  
462  
463  
464  
465  
466  
467  
468  
469  
469  
470  
471  
472  
473  
474  
475  
476  
477  
478  
479  
479  
480  
481  
482  
483  
484  
485  
486  
487  
488  
489  
489  
490  
491  
492  
493  
494  
495  
496  
497  
498  
499  
500  
501  
502  
503  
504  
505  
506  
507  
508  
509  
509  
510  
511  
512  
513  
514  
515  
516  
517  
518  
519  
519  
520  
521  
522  
523  
524  
525  
526  
527  
528  
529  
529  
530  
531  
532  
533  
534  
535  
536  
537  
538  
539  
539  
540  
541  
542  
543  
544  
545  
546  
547  
548  
549  
549  
550  
551  
552  
553  
554  
555  
556  
557  
558  
559  
559  
560  
561  
562  
563  
564  
565  
566  
567  
568  
569  
569  
570  
571  
572  
573  
574  
575  
576  
577  
578  
579  
579  
580  
581  
582  
583  
584  
585  
586  
587  
588  
589  
589  
590  
591  
592  
593  
594  
595  
596  
597  
598  
599  
599  
600  
601  
602  
603  
604  
605  
606  
607  
608  
609  
609  
610  
611  
612  
613  
614  
615  
616  
617  
618  
619  
619  
620  
621  
622  
623  
624  
625  
626  
627  
628  
629  
629  
630  
631  
632  
633  
634  
635  
636  
637  
638  
639  
639  
640  
641  
642  
643  
644  
645  
646  
647  
648  
649  
649  
650  
651  
652  
653  
654  
655  
656  
657  
658  
659  
659  
660  
661  
662  
663  
664  
665  
666  
667  
668  
669  
669  
670  
671  
672  
673  
674  
675  
676  
677  
678  
679  
679  
680  
681  
682  
683  
684  
685  
686  
687  
688  
689  
689  
690  
691  
692  
693  
694  
695  
696  
697  
698  
699  
699  
700  
701  
702  
703  
704  
705  
706  
707  
708  
709  
709  
710  
711  
712  
713  
714  
715  
716  
717  
718  
719  
719  
720  
721  
722  
723  
724  
725  
726  
727  
728  
729  
729  
730  
731  
732  
733  
734  
735  
736  
737  
738  
739  
739  
740  
741  
742  
743  
744  
745  
746  
747  
748  
749  
749  
750  
751  
752  
753  
754  
755  
756  
757  
758  
759  
759  
760  
761  
762  
763  
764  
765  
766  
767  
768  
769  
769  
770  
771  
772  
773  
774  
775  
776  
777  
778  
779  
779  
780  
781  
782  
783  
784  
785  
786  
787  
788  
789  
789  
790  
791  
792  
793  
794  
795  
796  
797  
798  
799  
799  
800  
801  
802  
803  
804  
805  
806  
807  
808  
809  
809  
810  
811  
812  
813  
814  
815  
816  
817  
818  
819  
819  
820  
821  
822  
823  
824  
825  
826  
827  
828  
829  
829  
830  
831  
832  
833  
834  
835  
836  
837  
838  
839  
839  
840  
841  
842  
843  
844  
845  
846  
847  
848  
849  
849  
850  
851  
852  
853  
854  
855  
856  
857  
858  
859  
859  
860  
861  
862  
863  
864  
865  
866  
867  
868  
869  
869  
870  
871  
872  
873  
874  
875  
876  
877  
878  
879  
879  
880  
881  
882  
883  
884  
885  
886  
887  
888  
889  
889  
890  
891  
892  
893  
894  
895  
896  
897  
898  
899  
899  
900  
901  
902  
903  
904  
905  
906  
907  
908  
909  
909  
910  
911  
912  
913  
914  
915  
916  
917  
918  
919  
919  
920  
921  
922  
923  
924  
925  
926  
927  
928  
929  
929  
930  
931  
932  
933  
934  
935  
936  
937  
938  
939  
939  
940  
941  
942  
943  
944  
945  
946  
947  
948  
949  
949  
950  
951  
952  
953  
954  
955  
956  
957  
958  
959  
959  
960  
961  
962  
963  
964  
965  
966  
967  
968  
969  
969  
970  
971  
972  
973  
974  
975  
976  
977  
978  
979  
979  
980  
981  
982  
983  
984  
985  
986  
987  
988  
989  
989  
990  
991  
992  
993  
994  
995  
996  
997  
998  
999  
1000  
1001  
1002  
1003  
1004  
1005  
1006  
1007  
1008  
1009  
10010  
10011  
10012  
10013  
10014  
10015  
10016  
10017  
10018  
10019  
10020  
10021  
10022  
10023  
10024  
10025  
10026  
10027  
10028  
10029  
10030  
10031  
10032  
10033  
10034  
10035  
10036  
10037  
10038  
10039  
10040  
10041  
10042  
10043  
10044  
10045  
10046  
10047  
10048  
10049  
10049  
10050  
10051  
10052  
10053  
10054  
10055  
10056  
10057  
10058  
10059  
10059  
10060  
10061  
10062  
10063  
10064  
10065  
10066  
10067  
10068  
10069  
10069  
10070  
10071  
10072  
10073  
10074  
10075  
10076  
10077  
10078  
10079  
10079  
10080  
10081  
10082  
10083  
10084  
10085  
10086  
10087  
10088  
10089  
10089  
10090  
10091  
10092  
10093  
10094  
10095  
10096  
10097  
10098  
10099  
10099  
100100  
100101  
100102  
100103  
100104  
100105  
100106  
100107  
100108  
100109  
100110  
100111  
100112  
100113  
100114  
100115  
100116  
100117  
100118  
100119  
100119  
100120  
100121  
100122  
100123  
100124  
100125  
100126  
100127  
100128  
100129  
100129  
100130  
100131  
100132  
100133  
100134  
100135  
100136  
100137  
100138  
100139  
100139  
100140  
100141  
100142  
100143  
100144  
100145  
100146  
100147  
100148  
100149  
100149  
100150  
100151  
100152  
100153  
100154  
100155  
100156  
100157  
100158  
100159  
100159  
100160  
100161  
100162  
100163  
100164  
100165  
100166  
100167  
100168  
100169  
100169  
100170  
100171  
100172  
100173  
100174  
100175  
100176  
100177  
100178  
100179  
100179  
100180  
100181  
100182  
100183  
100184  
100185  
100186  
100187  
100188  
100189  
100189  
100190  
100191  
100192  
100193  
100194  
100195  
100196  
100197  
100198  
100199  
100199  
100200  
100201  
100202  
100203  
100204  
100205  
100206  
100207  
100208  
100209  
100210  
100211  
100212  
100213  
100214  
100215  
100216  
100217  
100218  
100219  
100219  
100220  
100221  
100222  
100223  
100224  
100225  
100226  
100227  
100228  
100229  
100229  
100230  
100231  
100232  
100233  
100234  
100235  
100236  
100237  
100238  
100239  
100239  
100240  
100241  
100242  
100243  
100244  
100245  
100246  
100247  
100248  
100249  
100249  
100250  
100251  
100252  
100253  
100254  
100255  
100256  
100257  
100258  
100259  
100259  
100260  
100261  
100262  
100263  
100264  
100265  
100266  
100267  
100268  
100269  
100269  
100270  
100271  
100272  
100273  
100274  
100275  
100276  
100277  
100278  
100279  
100279  
100280  
100281  
100282  
100283  
100284  
100285  
100286  
100287  
100288  
100289  
100289  
100290  
100291  
100292  
100293  
100294  
100295  
100296  
100297  
100298  
100299  
100299  
100300  
100301  
100302  
100303  
100304  
100305  
100306  
100307  
100308  
100309  
100310  
100311  
100312  
100313  
100314  
100315  
100316  
100317  
100318  
100319  
100319  
100320  
100321  
100322  
100323  
100324  
100325  
100326  
100327  
100328  
100329  
100329  
100330  
100331  
100332  
100333  
100334  
100335  
100336  
100337  
100338  
100339  
100339  
100340  
100341  
100342  
100343  
100344  
100345  
100346  
100347  
100348  
100349  
100349  
100350  
100351  
100352  
100353  
100354  
100355  
100356  
100357  
100358  
100359  
100359  
100360  
100361  
100362  
100363  
100364  
100365  
100366  
100367  
100368  
100369  
100369  
100370  
100371  
100372  
100373  
100374  
100375  
100376  
100377  
100378  
100379  
100379  
100380  
100381  
100382  
100383  
100384  
100385  
100386  
100387  
100388  
100389  
100389  
100390  
100391  
100392  
100393  
100394  
100395  
100396  
100397  
100398  
100399  
100399  
100400  
100401  
100402  
100403  
100404  
100405  
100406  
100407  
100408  
100409  
100410  
100411  
100412  
100413  
100414  
100415  
100416  
100417  
100418  
100419  
100419  
100420  
100421  
100422  
100423  
100424  
100425  
100426  
100427  
100428  
100429  
100429  
100430  
100431  
100432  
100433  
100434  
100435  
100436  
100437  
100438  
100439  
100439  
100440  
100441  
100442  
100443  
100444  
100445  
100446  
100447  
100448  
100449  
100449  
100450  
100451  
100452  
100453  
100454  
100455  
100456  
100457  
100458  
100459  
100459  
100460  
100461  
100462  
100463  
100464  
100465  
100466  
100467  
100468  
100469  
100469  
100470  
100471  
100472  
100473  
100474  
100475  
100476  
100477  
100478  
100479  
100479  
100480  
100481  
100482  
100483  
100484  
100485  
100486  
100487  
100488  
100489  
100489  
100490  
100491  
100492  
100493  
100494  
100495  
100496  
100497  
100498  
100499  
100499  
100500  
100501  
100502  
100503  
100504  
100505  
100506  
100507  
100508  
100509  
100510  
100511  
100512  
100513  
100514  
100515  
100516  
100517  
100518  
100519  
100519  
100520  
100521  
100522  
100523  
100524  
100525  
100526  
100527  
100528  
100529  
100529  
100530  
100531  
100532  
100533  
100534  
100535  
100536  
100537  
100538  
100539  
100539  
100540  
100541  
100542  
100543  
100544  
100545  
100546  
100547  
100548  
100549  
100549  
100550  
100551  
100552  
100553  
100554  
100555  
100556  
100557  
100558  
100559  
100559  
100560  
100561  
100562  
100563  
100564  
100565  
100566  
100567  
100568  
100569  
100569  
100570  
100571  
100572  
100573  
100574  
100575  
100576  
100577  
100578  
100579  
100579  
100580  
100581  
100582  
100583  
100584  
100585  
100586  
100587  
100588  
100589  
100589  
100590  
100591  
100592  
100593  
100594  
100595  
100596  
100597  
100598  
100599  
100599  
100600  
100601  
100602  
100603  
100604  
100605  
100606  
100607  
100608  
100609  
100610  
100611  
100612  
100613  
100614  
100615  
100616  
100617  
100618  
100619  
100619  
100620  
100621  
100622  
100623  
100624  
100625  
100626  
100627  
100628  
100629  
100629  
100630  
100631  
100632  
100633  
100634  
100635  
100636  
100637  
100638  
100639  
100639  
100640  
100641  
100642  
100643  
100644  
100645  
100646  
100647  
100648  
100649  
100649  
100650  
100651  
100652  
100653  
100654  
100655  
100656  
100657  
100658  
100659  
100659  
100660  
100661  
100662  
100663  
100664  
100665  
100666  
100667  
100668  
100669  
100669  
100670  
100671  
100672  
100673  
100674  
100675  
100676  
100677  
100678  
100679  
100679  
100680  
100681  
100682  
100683  
100684  
100685  
100686  
100687  
100688  
100689  
100689  
100690  
100691  
100692  
100693  
100694  
100695  
100696  
100697  
100698  
100699  
100699  
100700  
100701  
100702  
100703  
100704  
100705  
100706  
100707  
100708  
100709  
100710  
100711  
100712  
100713  
100714  
100715  
100716  
100717  
100718  
100719  
100719  
100720  
100721  
1

Street Intersection"; "J" means "Traffic Jam"; "C" means Traffic Control". The traffic condition control center **8** broadcasts traffic conditions by radio. According to this embodiment, the radio transmitting receiving unit **2** is a pager adapted to receive broadcasting 5 from the traffic condition control center **8**.

Referring to FIG. 3, in order to reduce the length of transmission data so as to shorten transmitting or receiving time, the traffic condition control center **8** broadcasts the geometric zone code of the respective traffic condition and the traffic condition code of the corresponding 10 traffic condition. The code of geometric zone and the code of traffic condition are received by the radio transmitting receiving unit **2** (pager), and then stored in the memory device **5** for reading by the microprocessor **4**. The memory device **5** has stored therein the precision longitude and latitude coordinates ( $X_i, Y_i$ ) of every geometric zone, 15 and/or explanation of every traffic condition code.

The microprocessor **4** has set therein a predetermined condition, for example, the particular condition of "First Highway (HW01) + Radius 30 km Area". Therefore, when fetching the current longitude and latitude coordinates ( $X_c, Y_c$ ) of the car from the global positioning unit **1**, 20 the microprocessor **4** compares the longitude and latitude coordinates ( $X_i, Y_i$ ) of the geometric zone code of every traffic condition stored in the memory device **5**, and then selects the longitude and latitude coordinates ( $X_i, Y_i$ ) of the geometric zones of the traffic conditions that fit the predetermined condition and the corresponding traffic condition 25 information (see FIG. 4).

Thereafter, the microprocessor 4 controls the output unit 3 to output selected traffic condition information. The output unit 3 can be a LCD, OSD (On Screen Display), Head-up display, etc. for displaying traffic condition information by letters. Alternatively, the selected traffic 5 condition information shown in FIG. 4 can be displayed by graphics as shown in FIG. 5, in which the marks "X" between the location at 30km and the location at 35km means traffic jam locations. Further, voice-synthesizing device may be used to convert traffic condition information into voice for output. Preferably, the microprocessor 4 10 fetches and broadcasts the traffic condition information of the nearest location in the same forward direction in priority.

When matched with an electronic map database 6, the microprocessor 4 can read in an electronic map from the electronic map database 6 to display selected traffic condition locations on the display.

15 For example, FIG. 6 displays a Taipei City Electronic Map obtained from the electronic map database 6 subject to the predetermined condition of "Taipei City + Radius 5km Area" corresponding to traffic condition information shown in FIG. 3 (stored in the memory device 5), in which the mark "X" means traffic jammed intersection; "C" means traffic 20 control location.

Because the traffic condition reporting system computes the current longitude and latitude coordinates ( $X_c, Y_c$ ) of the car subject to the dynamic information provided by the global positioning unit 1 to further compare traffic conditions of different geometric zones 25 broadcasted by the traffic condition control center 8 and to output the

selected traffic conditions in time, the invention provides real time traffic condition information to every car driver subject to individual requirement.

Referring to FIG. 1 again, the traffic condition reporting system 5 further comprises an input unit 7 adapted to input or modify the pre-set condition. The input unit 7 can be function keys, a keyboard, or a radio receiver.

The global positioning unit 1 is not limited to GPS. Alternatively, the global positioning unit 1 can be a radio communication network, for 10 example, GSM (Global System for Mobile) network or GPS (Global Positioning System) network adapted to transfer the longitude and latitude coordinates of the nearest three base stations of the message so as to position the current geometric location of the car.

RDS (Radio Digital Broadcasting) or GPRS (General Packet 15 Radio Service) radio broadcasting can substitute for the radio broadcasting of the traffic condition control center 8. If the network has sufficient bandwidth or provides sufficient transmission speed, the traffic condition content broadcasted by the traffic condition control center 8 can be directly transmitted in full detail. If the computing speed of the 20 microprocessor 4 is sufficient to make a direct comparison, the memory device 5 can be eliminated.

Further, the traffic condition control center 8 can arrange and summary every traffic condition in advance, so as to reduce the length of transmission data. For example, it needs to transmit the first and last 25 traffic condition locations (the location at 30km and the location at 35km)

of six continuous traffic jam locations shown in FIG. 4 and the related traffic condition code only, and the transmission data can be modified to the format of “\$HW01S 030 035 J//”.

Although the present invention has been explained in relation to 5 its preferred embodiment, it is to be understood that many other possible modifications and variations can be made without departing from the spirit and scope of the invention as hereinafter claimed.